WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

SPECIAL PROVISION

FOR

SECTION 677
TRENCH DRAIN

677.1 – GENERAL:

Furnish and install precast trench drains, with all necessary fittings, coupling systems, frames, grates and associated items as shown on the plans or as directed by the Engineer in accordance with these special provisions.

Wherever the work disturbs existing conditions or work already completed, restore the same to its original condition in every detail. All such repair and replacement shall meet the approval of the Engineer.

It is the intent of this Section to require an installation, complete in every detail, whether or not indicated on the Drawings or specified herein. The Contractor shall be responsible for all details, devices, accessories and special construction necessary to properly furnish, install, adjust and place in continuous satisfactory service and complete the work in an acceptable manner.

677.2 – SUBMITTALS:

Make submittals to the Engineer for approval. The submittals shall include but not be limited to: Channels, frames, grates and solid covers.

677.3 – DESCRIPTION:

Trench drains shall have an inside width of not less than 4 inches (100 mm) and not more than 6 inches (155 mm) and a minimum wall thickness of 3/8 inch (10 mm). The interior surface of trench drains, below the level of the frame and associated connections shall be smooth. Trench drain channel sections shall be made of precast monolithic polymer concrete. There shall be no obstructions within the trench drain channel.

677.4 – MATERIALS:

Polymer concrete shall be made from a composition of aggregate and polyester resin or vinylester resin and shall have the following properties when tested as specified below:

PROPERTY	TEST METHOD	VALUE
Tensile Strength	ASTM C307	1450 lb/in2 (10 MPa)
Compressive Strength	ASTM C597	11,600 lb/in2 (80 MPa)
Bending Strength	ASTM C580	2,900 lb/in2 (20 MPa)

Moisture Absorption, %	ASTM C140	0.5 % maximum
Chemical Resistance	ASTM C267	Pass
Freeze/Thaw, number of Cycles w/o weight loss	ASTM C666	1600 cycles

677.5 – CONSTRUCTION:

The manufacturer of the trench drain shall furnish the Engineer a Certificate of Compliance in for each type of trench drain supplied.

677.5.1 - Earthwork: Trench drains shall be installed in a trench excavated to the lines and grades established by the Engineer. The bottom of the trench shall be graded and prepared to provide a firm and uniform bearing throughout the entire length of the trench drain. Excavation shall conform to the provisions of Section 604.

677.5.2 - Backfill: Concrete Backfill for trench drains shall meet the requirements of section 501 Class "B".

The thickness of the concrete backfill, when measured normal to the walls or bottom of the trench drain, shall not be less than 6 inches (150 mm).

The concrete backfill shall be placed in the trench against undisturbed material at the sides and bottom of the trench and in a manner that will prevent floating or shifting of the trench drain and voids in, or segregation of, the concrete backfill. Foreign material that falls into the trench, prior to or during placement of the concrete, shall be immediately removed. Where necessary, earth plugs shall be constructed and compacted at the ends of the planned backfill to contain the concrete backfill within the trench.

The concrete backfill shall be finished flush with the adjacent surfacing.

The surface of the concrete shall be textured with a broom or burlap drag to produce a durable skid-resistant surface.

677.5.3 - Laying Trench Drain: Trench drains shall be laid and jointed in accordance with the manufacturers recommendations.

Necessary facilities shall be provided for lowering and properly placing the sections of trench drains in the trench.

Trench drains shall be laid to the line and grade with the sections closely jointed and shall be adequately secured to ensure that no separation occurs during backfilling.

Trench drains shall be positioned in the excavated trench so that, when finished, the surrounding concrete backfill will be a minimum of 1/16 inch (2 mm) and a maximum of 3/16 inch (5 mm) above the level of the trench drain frame. In no case shall the frame or grate of the trench drain extend above the level of the surrounding backfill.

New trench drains shall be connected to new or existing drainage facilities as directed by the engineer. No reduction in the cross sectional area of the trench shall be permitted at the connection.

677.6 - FRAMES AND GRATES:

Trench drain frames and grates shall be made of ductile iron conforming to the provisions of Section 709.10. Bolts, nuts, frame anchors and other connecting hardware shall conform to the provisions of Section 709.24 and shall be galvanized.

Frames, grates and covers, when installed in accordance with manufacturer's recommendations and these special provisions, shall be capable of withstanding load

testing as specified in AASHTO Specification H-25 AND S-25 for Frames, Covers, Gratings, Steps, Manhole Sump and Catch Basin.

Frames shall be secured to the surrounding concrete backfill with steel anchoring rods a minimum of ¼ inch (6 mm) in diameter and a minimum of 6 inches (125 mm) in length or as shown on the plans. Alternatively, other methods of securing the frame to the concrete backfill or trench drain wall are acceptable, provided that a minimum pullout resistance of 700 lb/ft (10 kN per meter) of length of trench drain frame is assured. There shall be no obstructions within the trench drain channel.

Grates may be either integral with the trench drain or removable. However, a minimum of 3 feet (750 mm) of removable grates shall be provided at the end points of the trench drain and at a 100 feet (30 meter) spacing. Removable grates shall be held in place by locking devices that are tamper resistant and provide a minimum repetitive pullout resistance of 350 lb/ft (5 kN per meter) of length of trench drain grate after completion of 1000 hours of salt spray testing in accordance with ASTM Designation B 1 17. There shall be no obstructions within the trench drain channel.

Except for placement within designated pedestrian paths of travel, grates shall have openings to accept inflow of runoff equivalent to between 50 and 70 percent of the total top surface area of the grate, with individual openings or slots having a dimension of not greater than 2 inches (50 mm) measured in the direction of the trench drain flow line. When placed within designated pedestrian paths of travel, the grates shall be certified as conforming to the requirements of the Americans with Disabilities Act.

677.7 - METHOD OF MEASUREMENT:

The length of trench drain to be paid for will be the length measured along the pavement surface as designated by the Engineer. No payment will be made for trench drain placed in excess of the length designated.

677.8 - BASIS OF PAYMENT:

The contract price unit price shall include full compensation for furnishing all labor, materials (including frames, grates and hardware), backfill, excavation, tools, equipment and incidentals, and for doing all the work involved in installing the trench drain, complete in place, including structure excavation and concrete backfill and connecting trench drains to new or existing facilities, including concrete collars, reinforcement, or other connecting devices, as specified herein and shown on the plans.

677.9 - PAY ITEMS:

ITEM	DESCRIPTION	UNIT
677001-*	TRENCH DRAIN	LINEAR FOOT (METER)

*Sequence number